

Abstract of the Disclosure

Direct-metal deposition (DMD), preferably under closed-loop control, is used to fabricate alloy-variant material structures which provide a combination of desirable physical and mechanical properties. Use of the invention facilitates the production of

5 high-strength, high-wear, and impact-resistant structures which decrease the likelihood of erosion, heat checking and brittle failure in injection molds, die casting, thixomolding and other, more exotic tooling. The invention uses DMD to deposit a first material or alloy in an area exposed to high wear, such as the tooling gate area, with a second material or alloy being used elsewhere in the tool for greater impact resistance.

10 Advantageously, the areas may be of a user-defined thickness to further improve longevity. The resulting composite material structure has mechanical properties (i.e., yield strength, hardness and abrasion resistance) which exceed that of the homogeneous compositions currently used for mold materials, thereby enhancing productivity while improving part quality in these and other applications.